SEASONAL FLIGHT PATTERN OF PLECOPTERA FROM NORTH OTTER CREEK, VIRGINIA[1]

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ABSTRACT: Adult stoneflies were collected by a blacklight trap for one flight season from North Otter Creek, a 4th order Virginia stream. A total of 324 specimens were collected, representing 11 species of Perlidae and Perlodidae. Five species dominated; 2 species were collected for about a 7-week period, 5 over a 4-week period. Few stoneflies were collected by the trap when air temperature dropped below 7 C.

Little information exits on emergence patterns and flight period of adult stoneflies in eastern North America. Studies which report this type of information have employed tent or other emergence traps (i.e., Harper and Pilon 1970 and White et al. 1979). Blacklight traps can provide similar data. They are easy to employ and capture large numbers of specimens, often including rare species. Resh et al. (1975) pointed out the advantages and disadvantages of light trapping and the types of information obtainable. Fernando (1961) indicated that regular light trapping is a useful method of characterizing colonization cycles of many insects.

Some seasonal flight information for southeastern stonefly species has been reported by Morse et al. (1980). Our paper presents the pattern of adult stonefly occurrence over the flight season in 1981, based on blacklight trap collections from a Virginia stream.

Study Area

North Otter Creek (37°27'30"N, 79°27'30"W), a tributary of the Roanoke River Basin, lies at the boundary between the Blue Ridge and Piedmont Plateau physiographic provinces in the northern portion of Bedford County, Virginia. It is formed by the confluence of Overstreet and Gunstock creeks. The sampling site was located on the N.A. Boone Farm, off County Route 639, approximately 1700 m below Bedford Lake, a small 14.5 ha impoundment.

The substrate was mostly pebble (16-64 mm) with some cobble (64-256 mm), and silt accumulations were present in pool areas. The stream averaged 5 m wide and had a 16 m/km gradient. Dissolved oxygen concentrations were near saturation (> 90%) throughout the study period. The stream water pH ranged from 6.9-7.1 and was soft (mean alkalinity: 3.1 mg/l $CaCO_3$). Riparian vegetation was dominated by American

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sycamore (*Platanus occidentalis* L.) and speckled alder (*Alnus serrulata* Aiton).

Methods

A standard Ellisco Inc. general purpose blacklight insect trap (with GE F15T8/BL bulb) was operated continuously from 15 April to 20 September 1981. The trap was set 40 m from the stream margin and trap contents were examined, identified and enumerated every 24 hours. Daily fluctuations in air temperature were measured using a recording hygrothermograph (Cole-Parmer Instrument Co.). There were no other streams near the trap site.

Results and Discussion

A total of 324 specimens representing 11 species were collected. The seasonal pattern of stoneflies attracted to the trap is illustrated in Fig. 1. Five species were numerically dominant: *Perlesta placida* (44% of all stoneflies collected), *Acroneuria arenosa* (24%), *Isoperla dicala* (11%), *Acroneuria abnormis* (10%), and *Eccoptura xanthenes* (7%). All except

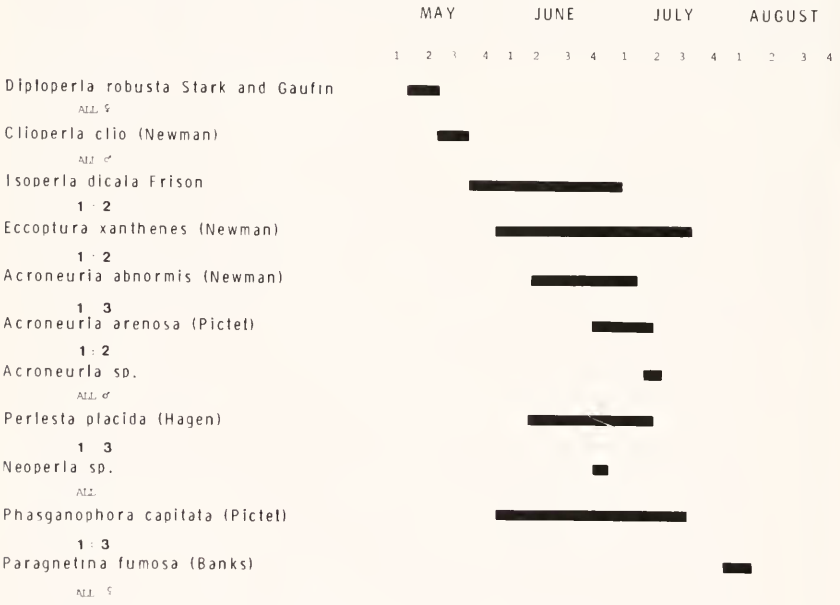

Fig. 1. Seasonal flight of adult stoneflies from May to August 1981, North Otter Creek, VA.

Diploperla robusta, Clioperla clio, and *I. dicala* (Perlodidae) belong to the family Perlidae, and members of both families are known to be readily attracted to light (Frison 1935, Hitchcock 1974, Stark and Gaufin 1979). The first stonefly, *D. robusta,* was trapped on 11 May and the last stonefly, *Paragnetina fumosa* on 3 August 1981. *Eccoptura xanthenes* and *Phasganophora capitata* exhibited the longest flight periods of about 7 weeks (Fig. 1). *Diploperla robusta, C. clio, Acroneuria* sp., and *Neoperla sp.* had very short flight periods of less than 1 week. These species were considered rare at this site. *Acroneuria abnormis, C. clio,* and *P. placida* have approximately 4 week flight periods. Morse et al. (1980) reported similar flight periods for some of the same species in South Carolina.

Nearly 73% of all stoneflies were collected in June, representing 7 of 11 species. *Clioperla clio* and *D. robusta,* are spring emerging species collected only in May during this study. Adults of *P. fumosa* have been recorded from April to September, however we collected it only in August. Maximum air temperatures averaged highest in June (Fig. 2) the month when almost two-thirds of all stoneflies were collected. Few adults were collected when air temperatures dropped below 7°C.

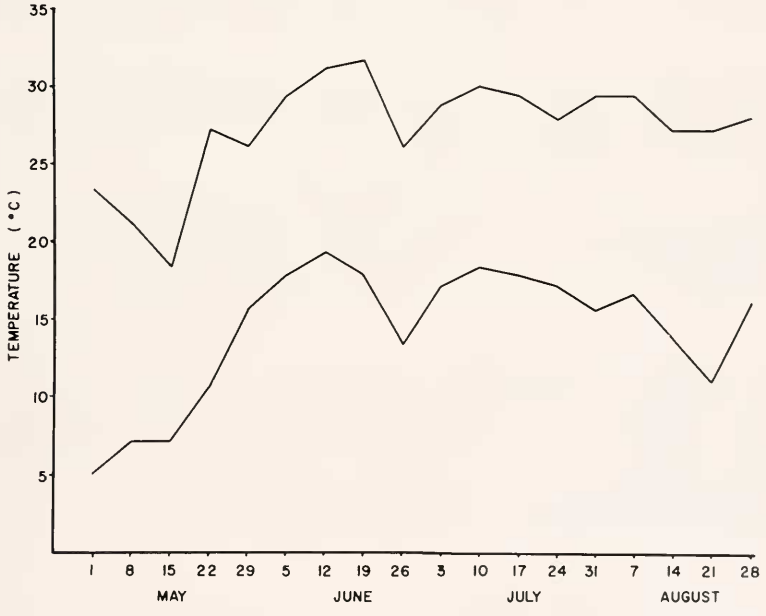

Fig. 2. Weekly range of air temperatures from May 1 to September 1, 1981, North Otter Creek, VA. Upper line is maximum, lower minimum.

Throughout the sampling period, less males were collected than females (Fig. 1) and the sex ratio was less than 1:2. Eighty-eight percent of females either carried extruded egg masses or were void of eggs, indicating that egg laying was occurring or had occurred. Active flying by females probably accounted for the higher capture rate of this sex.

No attempts were made to test light trap efficiency or effects of light intensity. Relative abundance of individuals or sex captured/hour was not recorded. Benthic surveys of North Otter Creek indicated the presence of nymphs of all the species attracted to the trap except *Acroneuria* sp., *D. robusta,* and *Neoperla* sp. Five species: *Amphinemura nigritta* (Provancher), *Leuctra* spp. (2 species), *Sweltsa onkos* (Ricker), and *Hastaperla brevis* (Banks) were collected only by kicknet during the period of trap operation. Adults of these genera typically are not attracted to light.

The majority of the species collected by the trap were widespread boreal species. These included *D. robusta, C. clio, I. dicala, A. abnormis, P. placida,* and *P. capitata.* No exclusively Appalachian species were collected even though the collecting site was at the boundary with the mountainous Blue Ridge Province. Stark (1979) considered *E. xanthenes* Appalachian, however in Virginia it occurs throughout the state. *Paragnetina fumosa* and *A. arenosa* are typical Piedmont and Coastal Plain species.

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